NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

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NRC RELEASES EVALUATION OF EFFECTS OF BALTIMORE TUNNEL FIRE ON RAIL TRANSPORTATION OF SPENT NUCLEAR FUEL

The Nuclear Regulatory Commission has released the results of two studies that calculated the potential effects of the Baltimore tunnel fire in July 2001 on a transportation cask carrying spent nuclear fuel. The studies concluded that the spent fuel transportation cask studied, when subjected to similar fire conditions, would not release radioactive materials, and public health and safety would be protected.

Following the derailment of a CSX freight train inside the Howard Street tunnel in Baltimore, Maryland, on July 18, 2001, the Commission directed the NRC staff to determine if current regulations for transporting spent fuel by rail provide adequate assurance that cask designs could withstand the fire conditions experienced in the tunnel after a tank car carrying approximately 28,600 gallons of liquid tripropylene ruptured and caught fire. (No nuclear materials were involved in the incident.)

The staff coordinated with the National Transportation Safety Board (NTSB), with assistance from the National Institute of Standards and Technology (NIST), the Center for Nuclear Waste Regulatory Analysis (CNWRA), and the Pacific Northwest National Laboratory (PNNL) to calculate the thermal conditions in the tunnel during the accident. NIST calculated fire temperatures as high as 1,800 degrees Fahrenheit in the narrow flaming region of the fire. The hot gas layer above the cars, within three rail-car lengths of the fire, averaged 900 degrees F. The tunnel ceiling directly above the fire reached 1,500 degrees F, while three car lengths away the ceiling temperature reached 750 degrees F. These results were confirmed by a separate analysis conducted by CNWRA by examining the damage to box cars and tanker cars removed from the tunnel after the fire.

The NRC staff, along with thermal analysis experts at PNNL, developed a model to test two different scenarios involving a spent fuel transportation cask. In the first scenario, the cask was assumed to be located one rail car's length (about 65 feet) away from the source of the fire; NRC and Department of Transportation regulations require such a buffer zone between spent fuel casks and other cars carrying hazardous materials. In the second scenario, the cask was assumed to be 16 feet from the source of the fire, even though such close proximity would be extremely unlikely. Both scenarios were calculated through 150 hours of fire exposure at maximum temperatures, even though the liquid trypropylene fuel in the actual Howard Street tunnel fire is believed to have burned for only about three hours.

The staff's analysis indicated there would be no failure of the structural components of the transport cask, and no failure of the canister containing the spent fuel inside the transportation cask. Overall, the staff concluded that there would be no release of radioactive materials from such a hypothetical event.

The documents released by NRC include SECY-03-0002, summarizing the staff's research and findings, along with two attachments: NIST's "Numerical Simulation of the Howard Street Tunnel Fire, Baltimore, Maryland, July 2001," and CNWRA's "Analysis of Rail Car Components Exposed to a Tunnel Fire Environment." They are available online through the NRC's Agencywide Documents Access and Management System (ADAMS), accession numbers ML030840076, ML030280369, and ML023460584. ADAMS may be accessed through the NRC's web page at http://www.nrc.gov/reading-rm/adams.html . For help using ADAMS, contact the agency's Public Document Room at (800) 397-4209.

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